HAMPTON BEACH STATE PARK

Flagship Beach Report
Summer 2008

Hampton Beach State Park, Hampton
Water Quality Report
Summer 2008

Prepared by:
Carolyn Merrifield, Jessica Devoid,
Teresa Ptak, Sonya Carlson & Jody Connor
Water Division

29 Hazen Drive, PO Box 95
Concord, NH 03302-0095
(603) 271-3503
www.des.nh.gov

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Thomas S. Burack, Commissioner
Michael J. Walls, Assistant Commissioner
Harry T. Stewart, Water Division Director

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Background

The New Hampshire Department of Environmental Services (DES) recognizes a public health threat may exist within recreational waters and tests the water at the state's beaches to ensure swimmers are not exposed to disease-causing pathogens or cyanobacteria scums. The DES has operated a Public Beach Inspection Program, commonly called the Beach Program, for over 20 years.

The New Hampshire coastal beach monitoring program was initiated in 1989 with the DES inspecting five beaches. In October 2000, the United States Congress amended the Clean Water Act to include the BEACH Act. The Environmental Protection Agency (EPA) could now was now authorized to award grants to eligible states to develop and implement monitoring and notification programs. These programs protect the public from exposure to pathogenic microorganisms in coastal recreation waters.

The DES first received grant funds in 2002. Since then the New Hampshire Beach Program has successfully met all of EPA's performance criteria requirements (*National Beach Guidance and Required Performance Criteria for Grants*) and continues to expand the monitoring and notification program. Weekly summer monitoring throughout the state was conducted at nine beaches in 2002, and has since doubled to 16 by 2008. The Beach program strives to expand sampling to include all coastal New Hampshire beaches.

EPA New England developed a Clean Beaches Initiative for New England states (www.epa.gov/ne/eco/beaches). The Clean Beaches Initiative's goal is to better protect public health by reducing beach closures. One way states will accomplish this goal is to establish "Flagship Beaches". Flagship Beaches were selected by coastal New England states in 2002. They were selected based on several factors: popularity, bather volumes, historical advisories or closures, and pollution sources. These beaches will develop enhanced monitoring and notification programs through federal funding in an effort to reduce beach closures and protect public health. Flagship beaches will lead by example and serve as models for beach management and protection.

The New Hampshire Department of Environmental Services (DES) nominated Hampton Beach State Park in Hampton to serve as the Flagship Beach for New Hampshire. Hampton is often the first area that comes to mind along the NH seacoast and is associated with numerous shops, restaurants, hotels and entertainment. The Hampton Beach area also boasts the only seacoast boardwalk in New Hampshire. These attractions lure thousands of daily visitors to the State Park and town of Hampton making this beach one of New Hampshire's premier summer tourist attractions.

Beach Overview

Hampton Beach is located just over the Massachusetts border and is less than an hour ride from the Maine border. North Beach, located on the northern side of Great Boar's Head, is also considered part of Hampton Beach State Park (Figure 1). The State Park and town of Hampton coordinate a variety of activities during the summer months. Among these are the annual master sand sculpting competition, the Hobie Cat Regatta, Miss Hampton Beach Pageant, Seafood and Children's festivals, nightly entertainment at the Seashell Stage, and weekly fireworks displays. The aesthetic qualities combined with a great variety of family-oriented activities make Hampton Beach one of the most popular attractions on the seacoast.

Hampton Beach State Park has been operated as a public beach since 1935 and monitored under the DES Beach Program since 1986. An estimated 100,000 people visit the park each year. Due to Hampton Beach's popularity, the DES strives to make water quality a priority. The DES Beach Program has adopted strict water quality standards for public beaches to provide a healthy swimming experience.

Hampton Beach has never been issued an advisory. The water quality at the beach has remained relatively unchanged throughout the years. The average Enterococci concentration since 1992 (prior to that fecal coliform was measured) is 7.2 counts/100 mL. Although the water quality at Hampton Beach has remained stable, the region around it has changed dramatically. The area surrounding the beach has become increasingly urbanized. Urbanization results in increased impervious surface area which poses a number of threats to water quality through nonpoint sources of pollution. Increased stormwater runoff, sewer overflows, septic failure, and boat sewage are all threats to Hampton Beach.

The Beach Program will work cooperatively with beach managers, municipalities, and the public to identify and reduce potential pollution sources to better protect public health at our Flagship Beach.
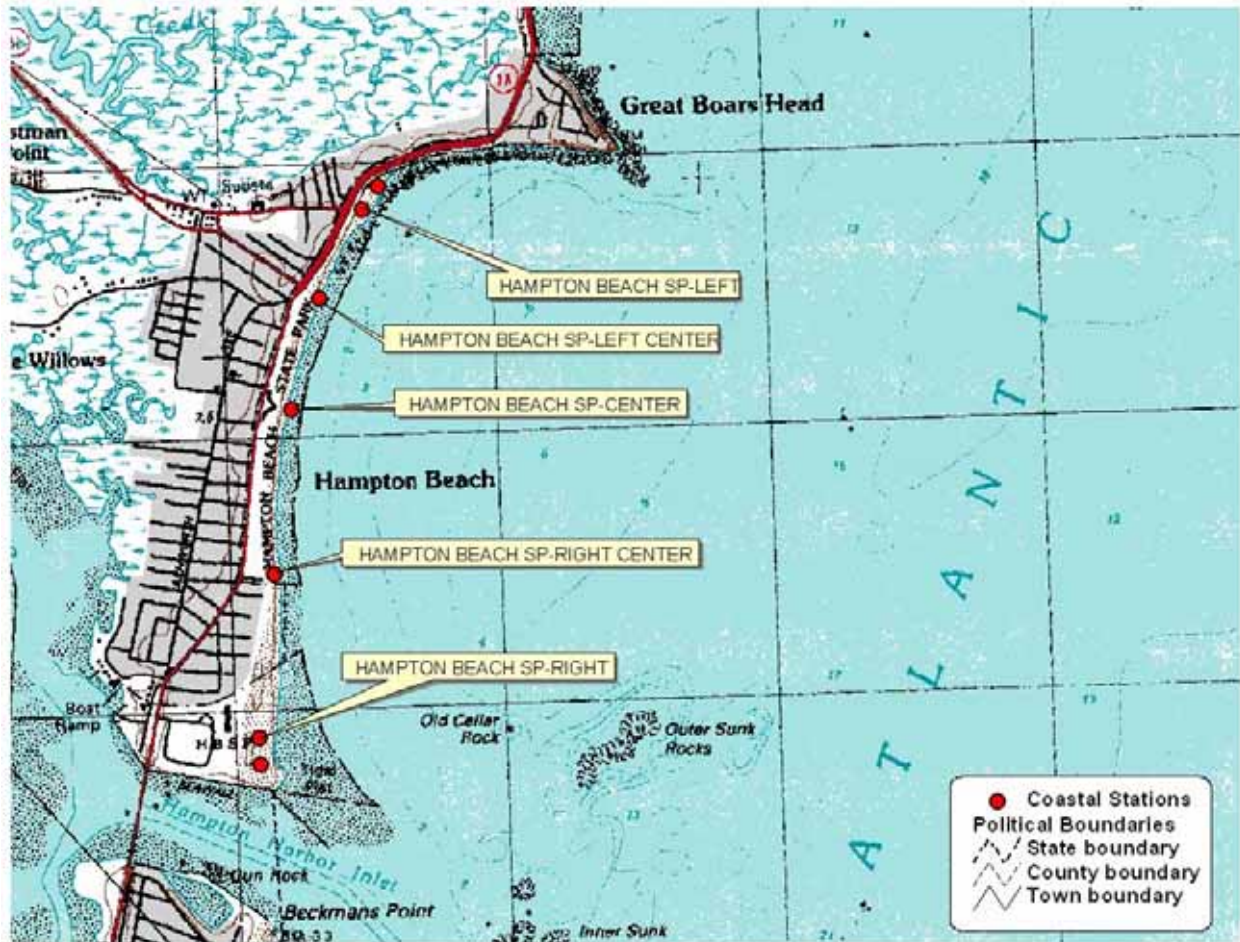
Figure 1. Hampton Beach State Park, Hampton, N.H.

Assessing Your Beach

Sampling Frequency and Location

The Beach Program developed a risk-based beach evaluation process and tiered monitoring approach during the 2003 beach season based on the EPA performance criteria. Beaches are evaluated annually to determine potential health threats to the public. Evaluations are based on several criteria within three main categories: beach history, microbial pathogen sources, and beach use. Beaches are now assessed as impaired for bacteria based on the most recent version of the Consolidated Assessment and Listing Methodology (CALM). The CALM assesses beach units as impaired based on historical exceedances of both the single sample and geometric mean bacteria standards. This report is submitted to EPA every two years.

Based on the evaluations, beaches are assigned a Tier I, Tier II, or Tier III status. Tier I beaches are considered "high priority" and have an increased potential to affect public health. Tier II beaches are "medium priority" and Tier III are "low priority" beaches that have less potential to affect public health. Beach sample frequency is based on Tier status; Tier I beaches are sampled twice per week, Tier II beaches are sampled once per week, and Tier III beaches are sampled every other week.

The number of samples collected at each beach is determined by the beach length. Beaches less than 100 feet in length are sampled at left and right locations one-third of the distance from either end of the beach. Beaches greater than 100 feet in length are bracketed into thirds and sampled at left, center and right locations. Routine sample collection may be enhanced by sampling known or suspected pollution sources to the beach area. Storm event sampling may be conducted at beaches where watershed runoff resulting from rainfall is expected to impact beach water quality.

Hampton Beach is a Tier I beach indicating high priority, necessitating sampling twice each week. The frequency of sampling at the beach has not changed since the launch of the beach evaluation process implemented in the 2003 sampling season. At Hampton Beach samples are collected at the left, left center, center, right center, and right stations regularly (Table 1). All stations are evenly distributed along the shoreline and can be accessed via the State Park parking lot (Figure 1).

Table 1. Hampton Beach Station Descriptions and Latitude/Longitude Points.

Description	Latitude	Longitude
Right: The right sample station is located at the southernmost section of the beach where the official State Park entrance is located. Walk straight through the picnic area to the beach access. Sample straight down from the access point.	42° 53' 54.306"	70° 48' 40.0123"
Right Center: The right center sample station is accessed from Haverhill Street off of Route 1A. Park at the end of Haverhill Street next to Oceanside Condominiums. Walk out to the beach and collect ocean sample in front of the storm drain. If the storm drain is flowing, collect samples from the flow as well.	42° 54' 13.2"	70° 48' 36.6"
Center: The center sample station is located directly in front of the Main Park Office. Park near the Seashell Stage area and take the sample straight down from the boardwalk access.	42° 54' 33.295"	70° 48' 34.4954"
Left Center: The left center sample station is located off of Route 1A. Park near the New Hampshire Marine Memorial Statue and collect sample in front of the statue.	42° 54' 46.1"	70° 48' 28.3"
Left: The left sample station is on the northernmost section of the beach close to an area known as Great Boar's Head. The beach area is sandy and the sample is collected on the left side of a rock jetty.	42° 54' 56.8932"	70° 48' 22.6826"

Coastal Water Quality Standards and 2008 Results

Beaches are monitored to ensure compliance with State water quality standards. Marine waters are analyzed for the presence of the fecal bacteria Enterococci. Enterococci are known as indicator organisms, meaning their presence may indicate the presence of other pathogenic organisms. The State standard for Enterococci at public beaches is 104 counts/100 mL in one sample, or a geometric mean of 35 counts/100 mL in at least three samples collected over sixty days. When samples exceed the standard, a beach advisory is issued, at which point the beach manager is notified and signs are placed at the entrances to the beach to warn the public of the potential health threat posed by water contact at the beach. Beach advisories remain in effect until subsequent beach sampling indicates safe water quality conditions.

The 2008 sampling season began May 27th. The sampling season encompassed 96 days. Precipitation was recorded on 32 days over the summer (based on Seabrook Power Station recorded precipitation). June wetfall totaled 1.85 inches while July and August yielded 4.48 and 3.26 inches of rain respectively.

At Hampton Beach, 31 routine inspections were conducted in 2008. One hundred and fifty-five samples were collected and tested for Enterococci (Table 2).   Overall, the 2008 summer Enterococci levels were very low and within the State's standards for Hampton Beach (Figure 2), with no advisories issued.

The bacteria level at the center station was elevated on August 5, with a count of 80 Enterococci/100 mL. It is unclear what may have caused this spike, although rain was recorded on each of the three days prior to sampling. Excessive wetfall can wash bacteria from the surrounding watershed into the beach area, potentially raising the bacteria counts of the water. Other potential sources of Enterococci to Hampton Beach include seaweed on the beach that may harbor sources of bacteria; high bather loads, as a result of warmer weather in summer months; and a high congregation of waterfowl documented at the beach. The results from August 5, though high, were still within the State's standard so an advisory was not necessary. Sampling on August 6 showed that bacteria levels at all stations were again at a normal, low level.

State Park management was once again proactive in removing trash and maintaining sanitary conditions at the beach. The Adopt-a-Beach Program continued throughout the 2008 season and was successful in performing monthly beach clean-ups. Maintaining a clean beach is an effective way to reduce waterfowl and associated fecal matter while reducing bacteria levels in the water.

Water quality did not appear to be negatively impacted by higher than normal precipitation. There was no direct relationship between area precipitation data and Enterococci levels at Hampton Beach.   DES will continue to compare daily wetfall data to Enterococci concentration at Hampton Beach State Park.

Table 2. Hampton Beach State Park 2008 Enterococci Data

| Date	Enterococci (count/100 mL)					Tide Height (feet)	Rainfall in previous 24 hours (inches)	Number of bathers	Animal Presence
	Left	Left Center	Center	Right Center	Right				
5/27/08	< 10	< 5	< 10	< 10	< 10	1.18	0	34	50 gulls, 35 pigeons
5/29/08	< 10	< 10	< 10	< 10	< 10	3.52	0.01	10	100 gulls, 20 pigeons, 4 dogs, dead fish
6/3/08	< 5	< 10	< 10	< 10	< 10	8.26	0.01	30	50 gulls
6/5/08	< 10	< 10	< 10	< 10	10	4.86	0.01	0	45 gulls, 15 pigeons
6/9/08	< 10	< 10	< 10	< 10	< 10	0.29	0	51	25 gulls
6/11/08	< 10	< 5	< 10	< 10	< 10	3.06	0.1	31	85 gulls
6/17/08	< 10	< 10	< 10	< 10	< 10	7.75	0.11	13	0
6/19/08	< 10	< 10	< 10	< 10	< 10	5.42	0	11	30 gulls, 5 pigeons
6/25/08	< 10	< 10	< 10	< 10	< 10	0.44	0	105	5 gulls
6/27/08	< 10	< 10	< 10	< 10	< 10	4.69	0	39	35 gulls
6/30/08	< 10	10	10	< 10	10	8.2	0	120	0
7/1/08	< 10	10	< 10	< 10	< 10	8.74	0	50	17 gulls
7/8/08	< 10	< 10	< 10	< 10	< 10	0.7	0	142	30 gulls
7/10/08	< 10	< 10	< 10	< 10	< 10	3.92	0	36	40 gulls, 1 dog
7/14/08	< 10	< 10	< 10	< 10	< 10	7.76	0	20	45 gulls
7/17/08	< 10	10	< 10	< 10	< 10	5.24	0	75	30 gulls, 5 pigeons
7/22/08	< 10	< 10	< 10	< 10	< 10	0.47	0	55	100 gulls
7/23/08	< 10	< 10	< 10	< 5	< 10	0.22	0	24	35 gulls
7/28/08	< 10	< 10	< 10	< 10	< 10	7.3	1.0	80	30 gulls
7/31/08	< 10	10	< 10	10	< 10	8.01	0.01	35	80 gulls
8/5/08	< 10	< 10	80	< 10	< 10	0.18	0.01	90	20 gulls
8/6/08	< 10	< 5	< 10	< 10	10	0.71	0.45	1	35 gulls
8/11/08	10	< 10	< 10	< 10	10	7.11	0.03	6	150 gulls, 5 pigeons
8/14/08	< 10	10	10	< 10	< 10	7.41	0.03	15	180 gulls, 20 plovers
8/19/08	< 10	< 10	10	< 10	< 10	2.13	0.06	12	100 gulls, 5 plovers, 1 duck
8/20/08	40	< 10	< 10	< 10	< 10	0.76	0.06	16	55 gulls
8/25/08	20	20	< 10	< 10	< 5	5.25	0	50	60 gulls, 35 pigeons
8/28/08	< 10	< 10	< 10	< 10	< 10	8.79	0	2	110 gulls, 10 pigeons
9/10/08	< 10	< 10	< 10	< 10	< 10	4.76	0.33	0	40 gulls
9/17/08	< 10	< 10	< 10	< 5	< 10	6.77	0	11	220 gulls, 1 dog
9/24/08	< 10	< 10	< 10	< 5	< 10	3.52	0	2	175 gulls, 4 dogs
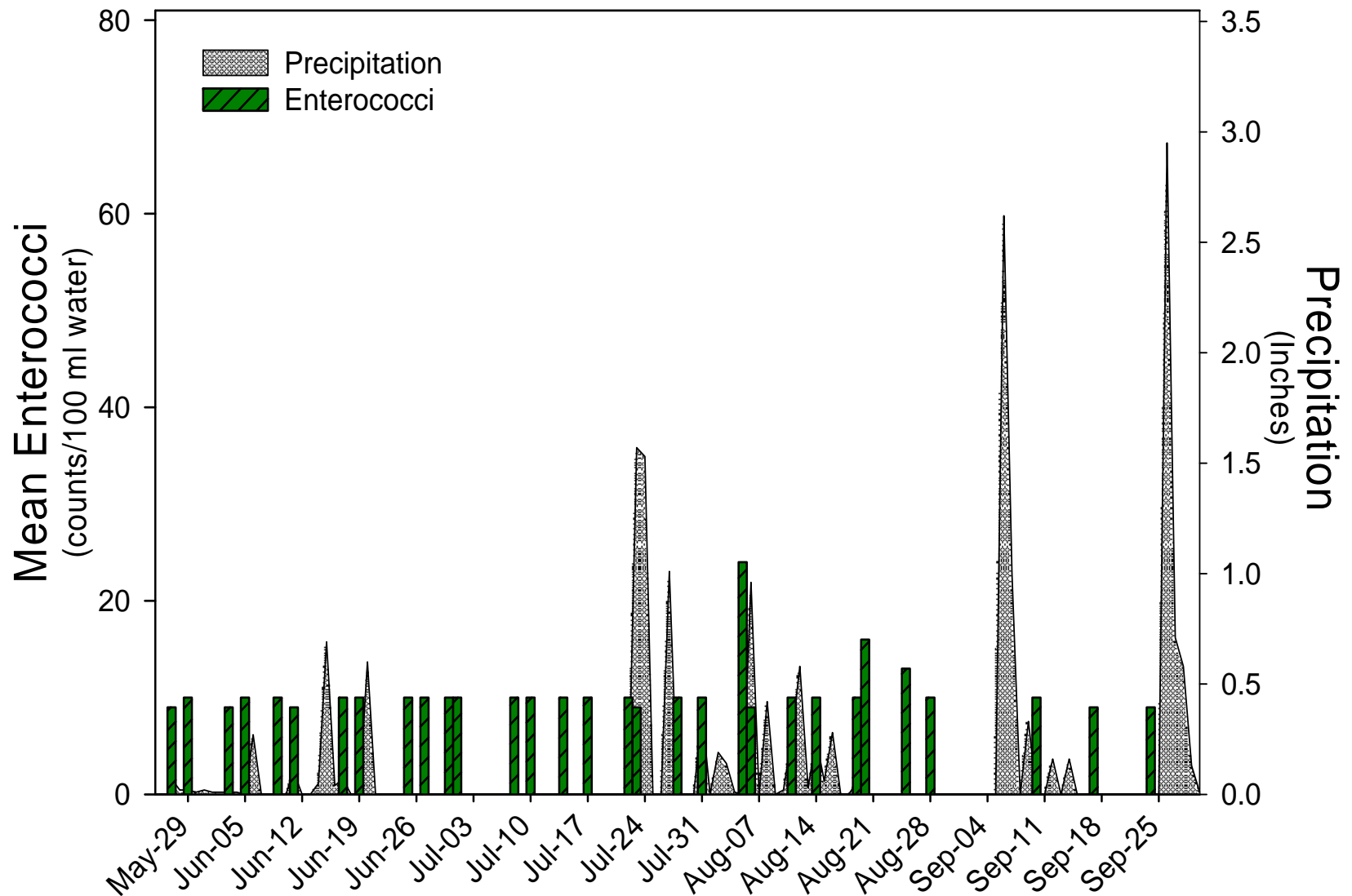
Figure 2. Hampton Beach 2008 Enterococci Data. Enterococci values are the mean of the five collected beach samples. No advisories were posted at Hampton Beach State Park during the summer of 2008. The elevated July and September rainfall did not increase beach bacteria values. See Table 2 for all results from all stations for the 2008 sampling season.

Hampton Beach Adopt-a-Beach Program

In response to growing concern over the amount of litter and marine debris impacting visual and environmental aspects of Hampton Beach, the Beach Program partnered with the Blue Ocean Society for Marine Protection from Portsmouth, N.H. Both parties met to discuss the development of an Adopt-a-Beach Program at Hampton Beach in the spring of 2005. The Blue Ocean Society agreed to add Hampton Beach to their Adopt-a-Beach Program and the Beach Program agreed to supply all necessary materials for adopting Hampton Beach.

Hampton Beach is in excess of 1 mile long and a single group of volunteers could not be expected to scour the entire beach length. Beach Program personnel divided Hampton Beach into five ¼ mile sections, Sections A through E (Figure 3). Beach Program personnel worked to recruit volunteers using press releases to increase awareness and interest from the local community. Currently, the Blue Ocean Society oversees the volunteer clean up efforts at Hampton Beach through the successful Adopt-a-Beach. In 2008, all sections of Hampton Beach were adopted and cleaned throughout the year by volunteers.

Volunteers conduct beach clean-ups about once per month and record items found on data cards. The litter is discarded into trash bags and weighed at the end of the clean up. The items recorded on data cards are tallied and sent to the Blue Ocean Society where the numbers are entered into spreadsheets and summarized for the year. (Table 3). Thirty-one clean-ups were conducted at Hampton Beach State Park in 2008. The most numerous items found were cigarette butts, plastic bottles (beverage, food, and other), metal cans, and straws. The combined weight of trash collected was 1,655 pounds.

Table 3. Hampton Beach Adopt-a-Beach Clean Up Data January - December 2008

| Section	Total Lbs	Gloves	Nets/ Traps	Floats/ Buoys	Fishing Line	Rope	Condoms/ Tampons	Metal Bev Cans	Bev Bottles	Balloons	6-pack rings	Straws	Syringes	Cigarette Butts	Styrofoam Cups
North Half	291	14	34	1	6	46	12	42	8	34	3	112	1	147	3
Sec. A	74	1	6	0	0	9	2	19	12	5	0	28	1	62	4
Sec. B	188	0	42	7	4	8	0	142	34	0	3	50	0	64	0
Sec. C	398	20	29.5	3	17	76	10	138	48	27	26	215	0	188	55
Sec. D	86.5	0	18	0	16	50	3	34	5	25	1	112	0	61	69
Sec. E	326	5	23	2	6	6	0	112	42	8	10	128	0	19	23
South Half	291	34	21	0	9	15	12	49	27	4	1	61	2	121	10
TOTALS	**1654.5**	**74**	**173.5**	**13**	**58**	**210**	**39**	**536**	**176**	**103**	**44**	**706**	**4**	**662**	**164**
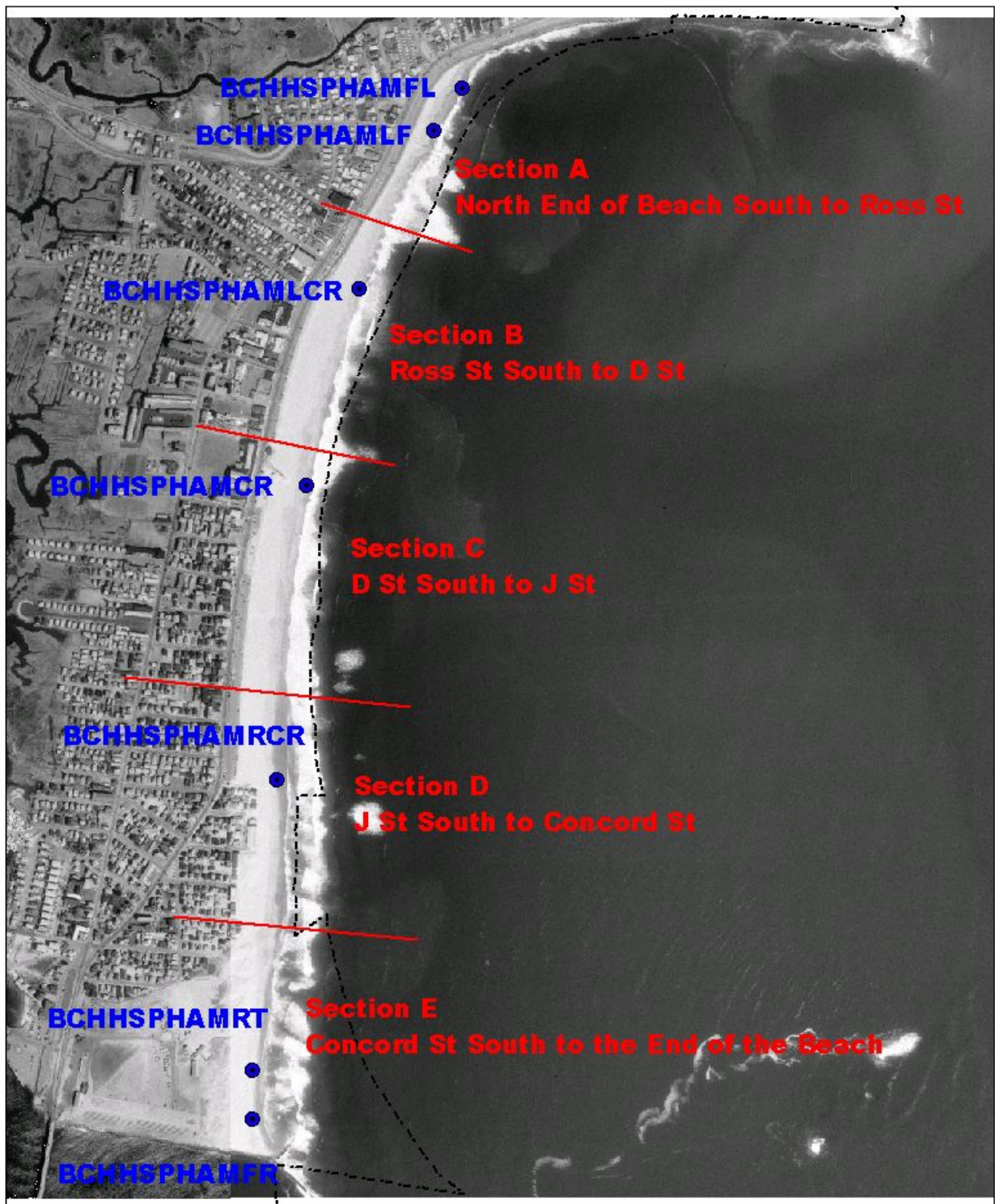
Figure 3. Hampton Beach Adopt-a-Beach Sections

Flagship Beach Accomplishments

The Clean Beaches Initiative was launched in 2002 with Flagship Beach nominations and recognition. The 2008 season marked the sixth year of Flagship Beach monitoring. The DES Beach Program continues to work cooperatively with Hampton Beach State Park to protect public health for those recreating at the beach. Accomplishments in 2008 include:

- Risk-based beach evaluations are conducted annually to identify potential bacteria sources to the beach, assess beach use, and determine beach importance to residents and the local economy.

- As previously mentioned, an Adopt-a-Beach Program was established at Hampton Beach State Park. The program successfully removed 1,655 pounds of litter from Hampton Beach in 2008.

- The National Resources Defense Council, a national environmental action organization, in its annual report "Testing the Waters", recognized Hampton Beach State Park with a five-star rating. This highest possible rating was given for the quality and quantity of beach sampling at Hampton Beach, as well as the low number of samples exceeding State standards for bacteria. Only nineteen other beaches across the United States received a five star rating.

Future Goals

The DES Beach Program, Hampton Beach State Park, and the Town of Hampton will combine efforts to promote healthy beach quality at Hampton Beach State Park. Future Flagship Beach goals include:

- Install pet waste stations providing dog walkers with bags to pick up their pet's waste. The stations also include signage and a waste receptacle where the public can dispose of the waste.

- Conduct GIS assessments during wetfall events to determine beach bacteria loading.

- Continue to post beach *Open* signs at all access points for Hampton Beach State Park (Figure 4). Half of the access points currently have signs posted; DES plans to post the remainder during the 2009 season. An exceedance of the Enterococci standard for public beaches would result in advisory signs posted over the *Open* signs.

- GPS all *Open* sign placement to provide park management with a guide to where advisory sign postings are required during a beach advisory event.

- Coordinate future education campaigns with will the State Park to prevent litter accumulations.
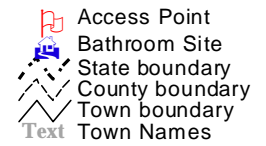
Hampton Beach State Park
Access Points

Access Point
Bathroom Site
State boundary
County boundary
Town boundary
Text   Town Names

Figure 4. Access Points to Hampton Beach State Park, Hampton, NH

Observations and Recommendations

- Results from beach clean up activities indicate that fireworks casings are often found littering the beach. Weekly firework displays are set off from the main beach area. The DES recommends an alternate location to hold weekly fireworks displays. One area that may be considered is the southern end of Hampton Beach at the State Park quarters. There is a large gravel/grass visitors parking area that might facilitate a fireworks displays. Or, consider simply removing firework casings from the beach area immediately after the event.

- Hampton Beach State Park is under excellent management and is a role model for coastal beaches. We applaud DRED for their diligent efforts to maintain a safe and healthy beach environment.

Appendix A: 2008 Special Report – Stormwater Modeling

When rain falls over the land, it flushes bacteria and other contaminants that have accumulated on the landscape to our beaches. As impervious areas like pavement and buildings are constructed in a subwatershed, more runoff contaminants are carried to our beaches. In addition to increased impervious cover as a result of land use changes, New Hampshire has recently experienced substantial and prolonged wetfall events. With increased flushing of the landscape combined with expanded impervious cover, it is imperative for local and state governments to explore new management techniques to protect New Hampshire beaches from contaminant sources.

DES Beach Program monitors New Hampshire coastal waters for potentially pathogenic bacteria. The DES has been monitoring these beaches since 1989 and has amassed large amounts of bacterial information for most coastal beaches. This collected information over the past years can be used to predict bacteria counts that can be expected with present and future development.

The DES Beach Program is proactive and always researching new management practices that can improve beach quality and new techniques to accelerate the beach advisory notification process. Beach Program personnel sample coastal beaches 4 days a week. Advisories are issued once state bacteria standards are exceeded. Despite our protective efforts, at least 24 hours pass from sample collection to bacteria count determination. During this time DES and swimmers are unaware of bacteria levels. The period of time between monitoring and sample analyses certainly put swimmers at risk for potential illness.

Two important Beach Program goals are to determine watershed contribution of bacteria to coastal beaches and to predict bacterial concentrations during and after a rain event. Mathematical models can be used to ascertain categories of bacteria sources and to predict bacteria concentrations after a rain event. Such models are complex and require a great deal of expertise and technical skill. The DES has selected FB Environmental to utilize an appropriate model and to train Beach Program personnel how to apply the model. With detailed predictions of how wetfall will affect bacteria transport to coastal beaches, future buildout planning, mediation, and construction could be guided by a stormwater model. The DES hopes the model will provide a useful tool for town officials and law makers to improve public notification and protect public health.

With the ability to predict public beach bacterial concentrations DES could immediately post an advisory based on predicted values and conduct follow up sampling for verification. A predictive model would allow advisories to be posted as soon as a public health threat occurs. Collecting samples during times of predicted high bacteria levels will help DES verify the accuracy and precision of the model. A model can be an effective tool in helping us achieve our mission to protect the public from exposure to waterborne illness while enjoying New Hampshire waters.

In addition to coastal bacteria data, the model will incorporate land use categories, hydrology, topography, historical precipitation records, historical tide data, and waste management. The data collection effort for this project has been time consuming and required help from several sources outside the DES.   The DES would like to thank the National Oceanic and Atmospheric Association, the National Climatic Data Center, the Seabrook Nuclear Power Station and the Pease Air National Guard Base Weather Station for providing data. The model is only as good as the data we input, so we strive for the best quality controlled verified data available. The project is due for completion in early 2009.